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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/536,721	03/28/2000	Toshiaki Hongoh	PM 266959	5386

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PILLSBURY WINTHROP, LLP
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EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/05/2003

19

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/536,721

Applicant(s)

HONGO, TOSHIKI

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 18-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 26 is/are allowed.
- 6) ☒ Claim(s) 1-9, 18-20, and 22-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1, 2, and 4-7 rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323).

Referring to Figures 14-19, column 11, line 46- column 12, line 67, and column 14, line 60 – column 15, line 13, Ishii et al. discloses a microwave plasma processing apparatus comprising a microwave introducing port 81 which introduces microwaves into the processing container 4 (processing chamber), dielectric material 80 for shortening the guide wavelength of the microwave (wavelength reducing member), a flat antenna member 44 (slot electrode) to form an electrostatic field in the processing space S, a dielectric-material accommodation portion 82a (antenna accommodating member) of the antenna covering member 82 which covers the dielectric material 80, and a ceramic protective plate 92 (dielectric material member) formed on the lower surface of the antenna member 44 that protects the antenna member 44 from plasma.

On the upper surface of the antenna covering member 82, cooling fins 84 (first temperature control device), cooling fans, or cooling jacket may be used to cool the flat antenna member 44, dielectric material 80, and dielectric accommodating portion 82a. Also, a cooling jacket 18 (second temperature control device) in support frame 8 cools the processing wafer.

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Ishii fails to teach a heating and cooling at least one of the slot electrode and components parts including the wavelength reducing member.

Referring to Figure 1a and column 4, lines 66 – column 5, line 8, Orezyk et al. teaches a temperature control plate including a cold plate 24 and a heater plate 23. The cold plate 24 and heater plate 23 are provided on the dome 14 (dielectric) and the top coil 29 to control the temperature of the dome at a specific range. Providing the temperature control plate to the dome reduces the flake or particle counts in the chamber. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the slot electrode and component parts including the wavelength reducing member of Ishii et al. with the temperature control plate as taught by Orezyk et al. This would reduce the amount of particle flaking from the chamber's components.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323).

Regarding the temperature of the temperature control device, it would have been obvious to one of ordinary skill in the art at the time of the invention to maintain the temperature of the slot electrode in a predetermined range of 60-80°C. This would prevent the slot electrode from physical deterioration and yield optimum processing conditions. The fact that Ishii et al. in view of Orezyk et al. are controlling the temperature establishes that it is a result effective variable and thus obvious to optimize through routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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4. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) as applied to claims 1, 2, and 4-7 above, and further in view of Trow et al. (U.S. 5,824,607).

The teachings of Ishii et al. in view of Orezyk et al. have been discussed above.

Ishii et al. in view of Orezyk et al. fails to teach a temperature control device for the periphery of a dielectric material member and a sidewall.

Referring to Figure 1, column 3, lines 60-63, and column 4, lines 40-50, Trow et al. teaches that it is well known to control the temperature of the entire dielectric material member 17W, 17T (including periphery) and the chamber walls 12 (sidewalls). Components 92, 94, 96 (temperature control device) provide a heat transfer medium to the chamber components 17W, 17T, 12 for temperature control. The temperature of these chamber components is controlled to enhance processing performance. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to control the temperature of the periphery of a dielectric material member and a sidewall of Ishii in view of Orezyk as taught by Trow et al. By controlling the temperature of dielectric material member and a sidewall, processing performance is enhanced.

5. Claims 18-20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) as applied to claims 1, 2, and 4-7 above, and further in view of Fujimoto et al. (Japanese Patent Publication 01-072526).

The teachings of Ishii et al. in view of Orezyk et al. have been discussed above.

Ishii et al. in view of Orezyk et al. fails to specifically teach a control unit, temperature

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sensor, and a heater.

Referring to the abstract and Drawings 1 and 2, Fujimoto et al. teaches a microwave plasma processor with an electrode 8 (slot electrode) connected to temperature control means (control unit). The temperature control means includes a heater 12 (heating wire), heater power source 9, and a thermometer 13 (thermocouple). The heater power source controls a current, which is made to flow through the heater 12 (heating wire) based on the detected temperature. It is important to control the temperature of the electrode in order to prevent instability in the plasma. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the slot electrode and wavelength reducing member of Ishii et al. in view of Orezyk et al. with a control unit, temperature sensor and heater as taught by Fujimoto. By controlling the temperature of the slot electrode and wavelength reducing member, instability of the plasma is prevented.

6. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) and as applied to claims 1, 2, 4-7 above, and further in view Shirasago et al. (Japanese Patent Publication 02-197575) and Trow et al. (U.S. 5,824,607).

The teachings of Ishii et al. in view of Orezyk et al. have been discussed above.

Ishii et al. in view of Orezyk et al. fails to teach a fluid controller with fluid flowing to a temperature control plate.

Referring to the abstract, Shirasago et al. teaches an electrode 110 provided with a pipe 1102 for flowing a fluid. The temperature of the fluid is measured using a thermocouple 1101

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and controlled by a temperature controller 1103. Furthermore, a feeder 1104 (mass flow controller and stop valve) regulates the feed rate of the fluid inside the pipe for temperature control of the electrode. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the temperature control plate of Ishii et al. in view of Orezyk et al. with a fluid controller as taught by Shirasago et al. since it is a suitable way to control the temperature of a chamber component.

Referring to Figure 1, column 3, lines 60-63, and column 4, lines 40-50, Trow et al. teaches that it is well known to supply a fluid to a dielectric material member 17W, 17T (temperature control plate). Components 94, 96 (temperature control device) provide a heat transfer medium to the dielectric material member 17W, 17T (temperature control plate) for temperature control. The temperature of the dielectric material member is controlled to enhance processing performance. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the temperature control plate of Ishii et al. in view of Orezyk et al. with the temperature control plate as taught by Trow et al. By controlling the temperature of temperature control plate, processing performance is enhanced.

Response to Arguments

7. Applicant's arguments filed June 26, 2003 have been fully considered but they are not persuasive.

Applicant has argued that Orezyk et al. fails to disclose, teach, or suggest a slot electrode or a wavelength reducing member much less a temperature control device constructed and arranged to control a temperature of at least one of the slot electrode and *component parts* including the wavelength reducing member.

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Ishii et al. discloses a slot electrode and a wavelength reducing member. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Orezyk et al. discloses a temperature control device including a cold plate and a hot plate to control the temperature of the dielectric dome. Hence, by providing the upper chamber portion 82 of Ishii et al. (Fig. 14, 15, 17) with the temperature control device of Orezyk et al., the temperature of at least one of the slot electrode and component parts including the wavelength reducing member will be controlled. Furthermore, Orezyk teaches controlling the temperature of a dielectric which is **component part** of applicant's microwave plasma processing apparatus.

Applicant has argued that the top coil 29 is not equivalent to the slot electrode of claim 1.

The Orezyk et al. reference was simply used to teach a temperature control device controlling the temperature of component parts.

Applicant has argued that there is no motivation to replace the cooling fins of Ishii et al. with the heater plate and cold plate of Orezyk et al.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5

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USPQ2d 1596 (Fed. Cir. 1988), and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to replace the cooling fins of cooling fins of Ishii et al. with the heater plate and cold plate of Orezyk et al. is to reduce the amount of particle flaking from the chamber's components.

Applicant has argued that the discovering the temperature range (between 60°C and 80°C) is not obvious because neither Ishii et al. nor Orezyk et al. disclose, teach, or suggest a temperature range between 60°C and 80°C.

Ishii et al. in view of Orezyk et al. teaches a temperature control device, therefore it is obvious to control the temperature at a specific range through routine experimentation.

Applicant has argued that Shirasago et al. merely shows a pipe 1102 wound in spiral conformation inside the hollow electrode 110 and that the electrode 110 in Shirasago et al. is not a plate. Thus, Shirasago et al. spiral pipe 1102 cannot be introduced into a plate conformation of the antenna member 44 of Ishii et al. or the cold plate 24 and heater plate 23 of Orezyk et al. Therefore, Shirasago et al. cannot be combined with either Ishii et al. or Orezyk et al.

Ishii et al. in view of Orezyk et al. teaches a generic cold plate 24 and heater plate 23. It is well known to heat a component using a heating wire or heated fluid and to cool a component using a cooling fluid, a fan, or cooling fins. In addition, Trow et al. teaches providing a fluid to a temperature control plate. Moreover, Shirasago et al. teaches a mass flow controller and stop valve used to control the feed rate of fluid used for temperature control. Therefore, by combining the references, it is obvious to control the amount of fluid to a temperature control plate using a mass flow controller and stop valve. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references.

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See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that Shirasago et al. spiral pipe 1102 cannot be introduced into a plate conformation of the antenna member 44 of Ishii et al. or the cold plate 24 and heater plate 23 of Orezyk et al. the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Allowable Subject Matter

8. Claims 21 and 26 are allowed

9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, either singly or in combinations, fails to anticipate or render obvious a microwave plasma processing apparatus comprising a wavelength reducing member, a slot electrode, a process chamber, and a temperature control device comprising a control unit, temperature sensor, and a heating wire wound on a fluid supply tube connected to a fluid passage in a temperature control plate to supply a fluid to the temperature control plate is patentable over the prior art.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC *amc*
September 3, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700